A. Summary

In early 2014, representatives of US nuclear utilities formed the Regulatory Issues Working Group (RIWG) under the auspices of the Nuclear Energy Institute (NEI). The RIWG identified several elements of the Reactor Oversight Process (ROP) that, in the industry's opinion, warrant reconsideration based on changes that occurred since the initial implementation of ROP in 2000. One element of the ROP identified by the industry for near-term priority review was the Component Design Bases Inspection (CDBI), the principal tool by which the NRC inspects and oversees licensee implementation and maintenance of nuclear plant design bases.

The industry's perspective is based on experience with the NRC's inspection and oversight of utility engineering and design basis programs since the inception of the ROP including the current "Component Design Bases Inspection" program. The industry recognizes that safe operation depends on maintaining the integrity of the plant's design and fidelity to its design bases. In addition, the industry recognizes the vital role of rigorous oversight of engineering and design programs by a strong, independent regulator. After weighing these considerations, the industry has concluded that the burden-to-benefit ratio of the existing CDBI program has increased significantly from the beginning of the program and new thinking is needed to restore balance in this ratio. This paper is intended to promote constructive dialogue with the NRC and other stakeholders to explore alternatives that could satisfy NRC's needs while eliminating unnecessary regulatory burden on sites hosting the CDBI inspection.

For perspective, this paper includes a discussion of the background and origin of the current approach to CDBI. The background discussion is followed by an assessment of the effectiveness of the existing process and its associated impact on nuclear stations. The assessment is based on a quantitative as well as qualitative analysis of the current program. The paper then presents principles to guide reformation of the CDBI, and several proposals based on those principles. Finally, as attachments, the paper presents industry survey data on the impacts of the CDBI process (Attachment 1) and industry assessment of the NRC's April 2014 proposed enhancements of the CDBI program (Attachment 2).

B. Origin of the CDBI Program

To gauge the effectiveness of the CDBI, it is essential to consider its roots and original purpose. On January 8, 1999, the NRC staff issued SECY-99-007, "Recommendations for Reactor Oversight Process Improvements," which forwarded the staff's recommendations for a revised Reactor Oversight Program (ROP) for commercial nuclear power plants. These recommendations consisted of a framework for regulatory oversight that established seven cornerstones of safety. These cornerstones were Initiating Events, Mitigation Systems, Barrier Integrity, Emergency Preparedness, Public Radiation Protection, Occupational Radiation Protection, and Physical Protection. Fundamental to this concept was that licensee performance that met the objectives and key attributes of these cornerstones would provide reasonable assurance that public health and safety were maintained.

As described in SECY-99-007, licensee performance within each cornerstone would be measured by a combination of Performance Indicators (PIs) and inspection results. PIs were developed for each cornerstone to provide an objective indication of licensee performance. A

risk-informed baseline inspection program was developed both to independently verify the PIs and to inspect those aspects of licensee performance not adequately covered by a PI. The risk-informed baseline inspection program established the minimum inspection effort that all licensees would receive, regardless of their performance.

During the development of the ROP, the NRC identified that engineering design and design control would not be measured by performance indicators for the mitigation and barrier cornerstones. As a result, the NRC proposed inspections of the licensee's maintenance of station design bases as well as the conduct of station modifications.

Inspection Procedure (IP) 71111.21, "Safety System Design and Performance Capability," (SSDPC) was developed as part of the ROP. The NRC's objective for this inspection was to verify that the design bases have been correctly implemented for selected risk-significant systems to ensure that the systems can be relied upon to meet functional requirements. SECY-99-007 stated that the basis for this inspection is as follows.

> "Inspection of safety system design and performance verifies the initial design and subsequent modifications and provides monitoring of the capability of the selected system to perform its design basis functions. The inspection should focus on the design and functional capability of components that are not validated by in-plant testing. Also, seismic and environmental qualifications of the SSCs should be verified. The PRA assumptions and models are based on the ability of the as-built safety system to perform its intended safety function successfully. If the design bases of the system had not been correctly implemented in the installed system, the operation and test procedures, and the supporting analyses and calculations, the system cannot be relied upon to meet its design bases and performance requirements. The design interfaces with support systems, such as cooling systems, ventilation systems, and instrument air system, should also be reviewed. The baseline inspection should focus on: (1) maintaining design bases (2) consistency with defense-in-depth philosophy, and (3) maintaining sufficient safety margins."

The staff proposed that this inspection should be conducted once every two years by a multi-disciplinary team. The resource estimate for this inspection was about 475 hours at a one-unit site and 500 hours at multi-unit sites. The scope of these inspections was to be focused on one or two risk-significant systems, or dominant accident sequence and review of systems and components associated with that sequence. The staff proposed the multi-disciplinary team would include individuals with design experience in mechanical engineering, electrical engineering, and instrumentation and controls, and operations if needed.

On April 2, 2000, the NRC implemented the ROP at all operating commercial nuclear power plants. Over the next several years, the NRC performed IP 71111.21 on a biennial basis. However, as discussed below, after the identification of several significant engineering issues outside of the Safety System Design and Performance Capability process, the NRC revisited the value of this inspection.

On April 29, 2004 the NRC issued SECY-04-0071, "Proposed Program to Improve the Effectiveness of the Nuclear Regulatory Commission Inspections of Design Issues." The purpose of this SECY paper was to obtain Commission approval of the NRC staff's methodology for conducting a pilot program to assist in determining whether changes should be made to the ROP to improve the effectiveness of NRC inspections in the design/engineering

area. The NRC staff stated that the driver for the pilot was concerns with effectiveness of the existing IP 71111.21. In the SECY paper, the staff presented the results of their data analysis of engineering issues since the start of the ROP. The NRC staff found that in the first three years of the ROP, 17 greater-than-Green engineering performance deficiencies were identified and only one of the 17 findings was identified as the result of an NRC design inspection. In addition, the NRC notes that the performance of IP 71111.21 failed to identify multiple engineering design issues at Point Beach and Davis-Besse that were later identified. The findings at Point Beach and Davis-Besse covered a wide range of design activities and included multiple examples of calculational errors, errors in the translation of design specifications, and test control weaknesses. Because these issues were not identified as being risk-significant, the NRC did not perform detailed extent-of-condition reviews of the identified issues, consistent with the ROP.

The SECY also proposed a prototype replacement for IP 71111.21. The significant changes in the prototype inspection procedure were as follows.

- Inspection samples would not be limited to one or two systems, but instead, would be focused on risk-significant, low-margin components and operator actions.
- Significant effort would be spent assessing relevant industry operating experience associated with the samples selected for inspection.
- The inspection sample would not be limited to mitigating system components and may include components that could be contributors to initiating events.
- If performance deficiencies are identified, extent-of-condition reviews would be performed, as required.
- A more detailed inspection report would be written that would include an integrated assessment of design/engineering weaknesses.
- Overall, the prototype inspection module was to be more resource intensive and would require about 700 hours of direct inspection versus the then-current allocation of approximately 500 hours for the safety system design inspection.

The NRC proposed four pilot inspections using this new guidance and committed to inform the commission of the results of these pilot inspections.

The NRC staff reported the results of these prototype inspections in SECY-05-0118, “Results of the Pilot Program to Improve the Effectiveness of Nuclear Regulatory Commission Inspections of Engineering and Design Issues.” In this paper, the NRC staff concluded that the prototype inspections were successful in identifying issues that would not have been identified using the existing IP and concluded that the prototype inspection guidance was more effective than the existing procedure. In addition, the NRC shared the lessons learned from the pilot inspections to be included in a new IP 71111.21. Of note, the staff stated in the SECY paper that “it is anticipated that *after the first round of inspections, the scope of some inspections may be reduced and that consideration may be given to crediting licensee self-assessments in lieu of some NRC inspections in this area.* [Emphasis added] This may result in a reduction in total inspection effort in the subsequent rounds of inspections.”

On January 1, 2006, the NRC implemented the new IP 71111.21 entitled “Component Design Bases Inspection.” The bases for CDBI differed from the previous inspection procedure. The NRC’s stated bases for the CDBI were as follows:

> “This inspection of component design bases verifies that plant components are maintained within their design basis. Additionally, this inspection provides monitoring of

the capability of the selected components and operator actions to perform their design bases functions. As plants age, modifications may alter or disable important design features making the design bases difficult to determine or obsolete.
The plant risk assessment model assumes the capability of safety systems and components to perform their intended safety function successfully. This inspectable area verifies aspects of the Initiating Events, Mitigating Systems and Barrier Integrity cornerstones for which there are no indicators to measure performance."

It should be noted that the CDBI expanded into the Initiating Events Cornerstone which resulted in a possible expansion of inspection sample selection.

The new CDBI IP was significantly different from the previous IP. The new IP added extensive guidance on inspection sample selection and size. New aspects to be inspected included consideration of operating experience, manual operator actions, corrective maintenance, and problem identification and resolution. The new CDBI IP had a slightly different inspection team composition than the previous IP. The new CDBI IP also used a multi-disciplinary team. This multi-disciplinary team is comprised of a team leader and two or three regional inspectors (operations/maintenance and engineering). In addition, the team includes two contractor design specialists in the mechanical and electrical/instrumentation and control disciplines. Also the resource estimate for completing the inspection dropped to 408 hours (plus or minus 15%). The frequency of the inspection remained the same, once every two years. In addition, the resource estimate was the same for single-unit and multi-unit sites.

The NRC has revised the CDBI IP several times since it was implemented in 2006. In 2008, the NRC reduced the frequency of the inspections to once every three years. This change was a result of the biennial NRC ROP realignment initiative in 2007. The NRC conducts this realignment initiative every two years in accordance with Appendix B of Inspection Manual Chapter 0307, "Reactor Oversight Process Realignment." The purpose of this effort is to review of the ROP baseline IPs to ensure the most effective overall application of inspection resources.

The key points to take from this evolution of the design basis inspection program are:

- The inspection continues to be risk-informed with a focus on areas of licensee performance not monitored by ROP performance indicators;
- The inspection has evolved to reflect experience as well as feedback from inspectors and the industry;
- The inspection procedure has evolved with regard to scope of systems/components subject to the inspection, sample selection, and depth of examination; and
- Recent NRC examination of the program anticipated further evolution; in particular, crediting licensee self-assessments as a component of the program.

C. Effectiveness and Impact of the CDBI

The CDBI was established as a high priority for the industry based on perceptions of:

- An increase in the inspection time onsite beyond the nominal three weeks, including expansion of the inspection to include the onsite preparation and sample selection week, the in-office inspection weeks, and even additional inspection issues subsequent to the exit;

- Increased challenges to maintaining operational focus for senior site leadership and on large numbers of station staff due to the protracted inspection activities;

- An increase in contentious issues of compliance, many of which have acknowledged low safety significance;

- An increase in inspection fees up to several hundred thousand dollars, as inspection scope, team size and contractor involvement have risen, and

- Few instances of safety significant findings or instances indicative of design basis program degradation.

NEI assembled a team of utility participants to gather information to test the validity of these perceptions and assess whether there remained a compelling basis to advocate for reforms to the NRC design inspection program. The industry performed a survey of utility experience with CDBI inspections. The survey and analysis of responses:

- DID validate instances in which inspection activities had expanded into the onsite preparation and sample selection week (i.e., the bagman week) and into the in-office preparation week;

- DID validate the significant impact on site senior leadership and departmental leadership focus and attention for a protracted period during, and frequently, after the onsite CDBI inspection activity was completed. In addition, the analysis confirmed the impact on plant staff in which large numbers of engineering and operations personnel and their supervision are focused for a significant period of time on supporting the inspection. While station support for NRC inspection activities is critical to the successful implementation of the NRC inspection program, the protracted time to conduct the CDBI is a distraction from other station activities important to safety;

- DID validate instances in which issues raised during inspection reflected a poor understanding of the current licensing basis by inspectors and inspection managers, or failure to follow processes for identifying managing the impact of emerging generic issues. Examples included postulated compliance issues with tornado missile and degraded voltage protection design features. These issues were pursued at multiple sites without being adequately understood and vetted by NRC management in advance, leading to contentious enforcement action with little safety benefit;

- DID validate a very high inspection fee averaging $360,000 per inspection and ranging up to $500,000 per inspection, and

- DID validate that very few instances of safety significant findings resulted directly from the CDBI inspection process. In addition, there was only one instance identified where deep-seated design basis program management problems were identified and where CDBI played a contributing role in the identification of that problem.

A summary of the survey is provided in Attachment 1 to this paper.

D. Basis for Proposals to Improve the NRC Engineering and Design Inspection Program

Based on the survey results, the industry concluded that reform of the NRC engineering and design basis inspection programs (i.e., the CDBI) is justified. The industry then established set of guiding principles and assumptions to steer proposed reforms. Those guiding principles and assumptions are:

1. The NRC oversight program will continue to include a robust engineering inspection to provide assurance of continued safe operation and to maintain public confidence in the regulatory framework. Engineering and design inspections require extensive planning, special skills, attention to detail, and adequate time to execute.

2. Proposed changes to the baseline inspection program must adhere to the founding principles of the ROP.

3. The CDBI should focus on identifying risk-significant weaknesses, including latent design problems.

4. Proposed changes to the CDBI should consider the cumulative impact of those changes on licensees and the NRC and strive to improve the efficiency of inspections where practical.

5. Alternatives to the current approach to CDBI (i.e., a large, team-based inspection) that have proven effective in other areas may be considered.

E. Specific Proposals to Revise the NRC CDBI Program

Based on these guiding principles and assumptions, the industry first explored conceptual changes to the current CDBI process. In developing the conceptual changes, the industry noted that under the existing ROP design bases inspection programs, the risk-significant elements of the plant design have been subjected to several cycles of thorough NRC inspection. As discussed in the survey results in Attachment 1, the CDBI over the past decade has identified a very limited number of risk-significant findings. The industry does believe that there remains a place for design basis inspections in the ROP. However, the industry holds the view that the value in periodic re-inspection of fundamental plant design no longer warrants an inspection approach of the scale and impact of the current CDBI. The industry recognizes that more dynamic challenges to maintenance of the design basis may be posed during plant modifications, a process that is currently addressed by the NRC's modification inspection process.

Consequently, the industry has concluded that proposed changes to the CDBI should include a significant scaling back of the current CDBI program. The industry believes that some adjustments to the plant modifications inspection may be warranted to account for the importance of the modification process to the overall integrity of the plant design basis.

Conceptual changes to the NRC inspection activities that address engineering and design basis programs include:

1. Revise the purpose and scope of NRC's engineering and design inspections to provide a greater focus on identifying latent design errors and examining the ability of licensees to maintain the integrity of the design basis over time. Such inspections would shift the emphasis somewhat from design verification to validation of the health of station programs that, if not effectively implemented, could adversely affect design margins. The industry believes this approach would better serve to accomplish the underlying objectives of the baseline inspection program and could do so with an inspection characterized by reduced scope, team size, and duration than the current CDBI.

2. Develop a performance-based process to adjust the scope, size, and duration of the inspections described above, based on a transparent assessment of utility performance and trends in the engineering and design arena. Limit the degree to which a CDBI could be scaled up beyond the reduced baseline discussed above to the parameters described in the current CDBI Inspection Procedure (71111.21 Issue Date 11/29/2013)

3. Establish means in the ROP assessment and inspection scheduling processes to give credit, in terms of alternate or reduced inspection, for structured, rigorous initiatives associated with engineering and design basis management such as design basis self-assessments, consistent with the discussion on credit for self-assessments in SECY-05-0118.

4. Establish a means by which potential generic issues arising from NRC engineering and design basis team inspections are more rapidly and transparently raised within the NRC and subsequently raised in dialogue with industry leadership. This will improve the tie between the NRC's generic issue resolution process and the CDBI inspection process to appropriately address proposed NRC design basis inspection findings which may have generic implications.

From these conceptual changes, the industry developed a set of specific proposals which complement these concepts:

1. Revise the inspection procedure 71111.21 to focus on potential latent design errors, translation of design output into operating and maintenance procedures, and engineering programs that could impact design margins such as modifications and aging management programs.

2. Revise the Plant Modification Inspection Procedure IP 71111.18 to:

    a. Increase the number of samples selected from 3-7 to 5-10; and

    b. Increase the number of allotted inspection hours from 36-48 hours to 75-100 hours per year

    The changes to the Plant Modification inspection are considered a reasonable re-allotment of inspection resources into an aspect of the management of plant design basis that is more dynamic than the aspects covered under the current CDBI.

3. Revise the CDBI Inspection program to include a nominal design basis team inspection that is reduced in scope and team size from the current program. Include a means by

which stations with evidence of performance weaknesses in engineering and design basis control result in an increased inspection of scale, scope and duration that ranges up to the *current* inspection procedure 71111.21. Specific changes for the nominal design basis team inspection would include:

a. Reducing the existing sample size from 15-25 to 7-10 risk significant samples;

b. Alter the onsite inspection week allowance from three weeks (plus the "bagman week) to two weeks (plus the bagman week);

c. Reduce the inspection resource estimate from 408 hours to 200 hours with a concurrent reduction in inspection team size to a team leader and two regional inspectors;

Changes 3a, b and c above are viewed as a reasonable reduction in the CDBI size and scale that will reduce the significant site impacts of the current CDBI team inspection while still preserving a periodic NRC inspection that may identify latent design errors and errors in implementing and maintaining the design basis for risk significant systems and components.

d. Eliminate the use of contractor inspectors for the nominal design basis team inspection; contractor inspector usage would be reserved for instances in which utilities are selected for enhanced design basis team inspections, and

Elimination of the routine use of contractor inspectors is proposed to reduce NRC reliance on inspectors who may not have a full understanding of the current licensing basis and the regulatory framework.

e. Specifically include criteria for sample selection that examines the aging effects on risk significant passive components for plants in periods of extended operation.

4. To implement a means by which utilities with identified problems in engineering and design basis programs may be subjected to a design basis team inspection above the reduced baseline CDBI (reduced as described in element 3 above) up to the extent of the current CDBI, identify appropriate indicators and thresholds for scaling the CDBI in the ROP assessment process. These indicators could include:

   a. Negative trends of margin in the Mitigating Systems Performance Indicators;

   b. Inspection findings and corrective action program trends that indicate equipment reliability challenges; or

   c. Evidence of weakness in key programs that, if not maintained, could introduce latent design failures or reduce design margins (e.g., EQ and Motor Operated Valve programs).

5. Revise the CDBI inspection program to limit applicability to the Mitigating Systems and Barrier Integrity cornerstones. The industry strongly opposes expansion of the CDBI beyond Mitigating Systems and Barriers to examine the design of systems and

components that support programs such as security and emergency preparedness. The existing baseline inspections of the Security and Emergency Preparedness Cornerstones, along with the ROP Performance Indicators, are sufficient to assure public health and safety, and provide for adequate regulatory oversight of licensee performance in these areas. Finally, expansion of the CDBI to these other cornerstones is not consistent with the basis of the ROP as documented in Inspection Manual Chapter (IMC) 0308, “Reactor Oversight Process Basis Document.” Specifically, the technical framework for the Emergency Preparedness, Initiating Events, and Security Cornerstones does not describe design as a key attribute.

6. Develop a new element of the design basis inspection program that would allow stations that implement focused scope (or broad scope) design basis self-assessments activities to be eligible for elimination of CDBI inspections on a cycle by cycle basis. Eligibility requirements for such design basis self-assessment might reasonably include:

    a. Risk significance of systems/components undergoing self-assessment;

    b. Inclusion of peer review in the self-assessment effort, and

    c. Transparency to the regulator of the initiative.

    This change is proposed to capture the potential for crediting of utility self-assessments as articulated in SECY-05-0118.

7. Implementation of a periodic public meeting in which NRC managers and industry leadership review issue trends observed during design basis and plant modification inspections. The identification of potential generic issues should be an explicit element of the meeting.

Attachment 1 - CDBI Survey Summary

In June 2014, a utility survey on CDBIs was forwarded to each site through the Regional Utility Groups (RUGs). Survey responses were received from 33 nuclear sites located in various Regions. The survey included several questions that requested utility management perspectives about aspects of the CDBI program. The survey also included questions that warranted a detailed look at the NRC fees as well as utility staff and contract costs associated with preparation for and support during and after the CDBI inspection.

Survey Results Summary

Survey responses were received from 33 nuclear sites located in various Regions (listed below). Responses ranged from very detailed to those only stating NRC fees for the last CDBI. The survey responses were summarized based on the reviewer's understanding of the data. The eight survey questions and summary of responses for each question are provided below.

CDBI Survey Responses by Region				
Region	Site		Region	Site
I	Fitzpatrick		II	Oconee
	Beaver Valley			North Anna
	Calvert Cliffs			Surry
	Ginna			VC Summer
	Hope Creek			Brunswick
	Indian Point			Watts Bar Unit 1
	Limerick			Browns Ferry
	Millstone			Sequoyah
	Nine Mile Point		III	Point Beach
	Oyster Creek			Palisades
	Peach Bottom		IV	Palo Verde
	Pilgrim			Diablo Canyon
	Salem			Riverbend
	Seabrook			South Texas Project
	Susquehanna			Arkansas Nuclear
	Three Mile Island			Cooper
	Vermont Yankee			

The NRC currently conducts CDBIs on a triennial basis at each site. The survey data indicates that for CDBIs conducted since 2011, the average NRC fee per inspection was $361,911. In addition to NRC inspection fees, licensees generally also incurred significant time and labor costs; in some instances, several thousand licensee hours were expended costing as much as $650,000 plus contractor support. Overall costs did not appear to be related to the number of operating units per site or the age of the plant. The majority of respondents were in favor of a revision to the current CDBI process, due to the substantial cost in time and resources, the low safety significance of typical findings, and the fact that most risk-significant systems have already been inspected under the CDBI process, in some cases multiple times (i.e., turning over the same rocks over and over again). Many of the responses provided recommendations for alternative approaches to the current CDBI process, while retaining the inspection objectives. Alternatives included: modifying the CDBI process by reducing scope; or eliminating the CDBI

inspection procedure and incorporating elements of CDBI into other existing baseline inspections.

Survey Response Data Summary

1. *The NRC assesses fees for the preparation, conduct, and documentation for each CDBI. What were the fees for your most recent CDBI?*

   Based on responses from 29 of the 33 sites, the average NRC invoiced fee per CDBI is $361,911, with a range of $180,000 to $500,000. The NRC inspection team was typically comprised of five inspectors including contractors. Inspections could span over a three-month period of time including two to three weeks onsite, visits to the licensee's corporate office, and several offsite weeks, plus follow-up inspection by the region or resident.

2. *What are the estimated licensee time and labor costs for the preparation, direct inspection support, and follow-up from your most recent CDBI?*

   A full time inspection response team was generally used during the two- to three-week onsite inspection, with part-time support from numerous others (e.g., subject matter experts). The team was multidisciplinary, but mostly engineering, consisting of 3-25 members, including contractors and industry peers. Total cost for pre-inspection preparation, direct support during the inspection, and follow-up activities ranged from about $10,000 to $650,000 not including contractor cost. A few hundred to several thousand hours were expended in supporting each inspection. Inspection preparation included conducting a self-assessment which could begin as early as six months prior to the onsite inspection.

3. *What are the estimated consultant/contractor labor costs for the preparation, direct inspection support, and follow-up from your most recent CDBI?*

   Over half of the respondents used contractors to support various portions of their inspection response effort. Costs ranged up to $280,000. Support was mostly engineering with some regulatory and specialty (e.g., PRA) support.

4. *What type of preparation is conducted for CDBIs and what is the cost of this preparation?*

   This question pertained to pre-inspection focused self-assessments and external assessments. All but two sites performed self-assessments (one due to short notice of inspection schedule change). At least one site performed an external readiness assessment using contractors.

   Self-assessments were generally conducted by a full time team over one to two weeks, plus additional time and resources for preparing the report and issue resolution. The team consisted of 4-28 people including contractors and industry peers. Cost for the assessment ranged from about $2500 to $180,000, with 50 to 1500 hours expended.

5. *Provide a short description of two or three of the most impactful CDBI findings. Please characterize the nature of the impacts in terms changes to plant design, protracted resolution time with the NRC, engagement of Senior Executive attention in order to resolve.*

Several sites had no violations or findings identified in the last CDBI. Most inspection findings were characterized as Green non-cited violations (NCVs), resulting in minimal impact (e.g., revisions to procedures or calculations, performing a surveillance), and managed by the Corrective Action Program. There were at least four sites with potentially impactful Unresolved Items: a 2011 issue currently being reviewed by NRC Region staff, a 2012 issue being reviewed by NRR which could result in a plant design change, and issues from two 2014 inspections which could have significant impact in terms of level of effort and cost.

6. *Provide a short description of any "greater than green" findings identified during a CDBI at your site.*

   There have been three greater than Green findings since 2007. There have been no greater than Green findings since 2010.

7. *In terms of confirming priorities for the RIWG, please provide your utility's perspective as to why CDBI revisions are a high priority.*

   There was general agreement that the cost of the inspection outweighs the safety benefit. The total cost can be as high as $1 million for a single inspection. The findings are typical of those identified by routine resident inspections. Engineering resources could be more effectively applied to other site issues. The most risk significant systems have already been inspected under the CDBI process, in some cases multiple times.

8. *Given that the NRC has a role in conducting oversight over licensee management of the plant design basis, please provide any concepts by which the NRC's objectives could be achieved with a regulatory approach that is different than the current CDBI approach.*

   Many of the responses provided recommendations for alternative approaches to the current CDBI process, while retaining the inspection objectives. Alternatives included: modifying the CDBI process by reducing or changing scope; or eliminating the CDBI inspection procedure and incorporating elements of CDBI into other existing baseline inspections. These alternatives are described as follows:

   - Conduct reduced scope inspection annually, using one or two inspectors for one week.
   - Reduce scope by conducting deep-dive inspection focused on one mechanical and one electrical area. This should provide sufficient insight to determine if design basis is being properly maintained, or if a broader inspection is necessary.
   - Reduce CDBI scope and resource demand, and conduct a one-week inspection. Also, the resident inspector could periodically review CDBI-type samples.
   - The CDBI concept is acceptable, but the scope should be reduced - smaller team, shorter duration, carefully chosen and limited scope samples (e.g., electrical coordination of a single 4160 volt safety-related train).

Recommendations involving eliminating the CDBI inspection include:

- Since most risk-significant systems have been previously inspected under the CDBI process, eliminate the CDBI and use the existing modification/50.59 inspection to review any changes made to the plant design basis.
- Eliminate CDBI and incorporate elements/components into one or more existing baseline inspections to achieve the desired objectives goals. Examples of these existing inspections are: modifications/50.59, PI&R, Triennial Heat Sink, and resident integrated quarterly inspections.
- Eliminate CDBI and include CDBI samples under the resident baseline inspection.
- In lieu of the CDBI, a comprehensive design basis self-assessment could be completed by the licensee. The NRC could then verify the assessment was of sufficient quality and depth to basically meet the CDBI objectives.

Survey Conclusions

Based on a review of the survey responses and recent CDBI enforcement history, it is clear that CDBIs represent a significant resource demand on licensees. Most licenses expended more than $500,000 to support these inspections, and some licensees have expended close to $1,000,000. As of May 2014, the NRC had documented 773 findings in CDBI inspection reports. Of those 773 findings, three findings were greater than Green. This is less than 0.4% of all CDBI findings. In addition, the NRC has not identified any greater than Green findings since 2010. To survey respondents this suggests that the size and scope of theses inspections are not commensurate with the safety benefit and should either be significantly reduced in scope and frequency, or eliminated.

There was an almost unanimous view by the respondents that CDBI needs to be changed; however, there was not unanimity on what that change should be. Some of the respondents suggested an elimination of the inspection. Others suggested a reduced scope and frequency while others suggested that the design engineering inspections be performed by resident inspectors.

Attachment 2 - Industry Perspectives on NRC Recommended Changes to CDBIs

On April 4, 2014, the NRC made public the results and recommendations of the NRC's staff's efforts related to the baseline inspection program portion of the Reactor Oversight Process (ROP) Enhancement Project. The NRC made the following recommendations regarding CDBIs. Industry perspective follows below each recommendation.

1. **Significantly reorganize this inspection to include (1) deep design review, (2) program reviews when needed, and (3) operating experience topics.**

   Industry agrees with this recommendation to the extent that it implies a sample selection that is different and of increased value from the risk-informed selection criteria in the current CDBI procedure. Most risk-significant systems have already been inspected multiple times. The public safety value of continuing inspecting these systems is low.

2. **Inspection would remain at a triennial frequency; however, regions can decide on implementation – that is, one large team or several smaller teams – the entire procedure would be complete within three years.**

   Industry agrees with the frequency of design basis team inspection remaining at three years. More specific restructuring of the implementation of the inspection is discussed in the main body of the paper.

3. **The deep design review would be similar to that of the current IP; however, the sample size would be smaller and the attributes reviewed would be greater. Inspectors would have more time to delve into other attributes such as aging, equipment replacement, and preventive maintenance/vendor recommendations. Inspectors should also focus attention on operability evaluations.**

   Industry agrees with some aspects of this recommendation. More specific recommendations regarding sample size and inspection focus are described in the main body of the paper.

4. **Program reviews would be conducted based on trends identified by the resident inspectors or if a finding from the team inspection indicates a broader misunderstanding or misinterpretation of a rule/regulation or incorrect implementation of actions taken in response to previously issued generic communication.**

   Industry agrees with this recommendation and has included a more specific approach to the program review in the main body of the paper.

5. **Potential samples would be expanded to include (1) emergency response facilities (and their ability to meet their licensing/design bases), (2) security, if applicable, and (3) components not modeled directly in the probabilistic risk assessment.**

   Industry disagrees with this recommendation. Expansion of CDBI to cornerstones beyond Mitigating Systems and Barriers is unwarranted. Existing inspection of the Initiating Events, Security and Emergency Preparedness Cornerstones, along with the ROP Performance Indicators, are sufficient to assure public health and safety. Expansion to the Security and Emergency Preparedness Cornerstones is not consistent with the basis of the ROP as

documented in Inspection Manual Chapter (IMC) 0308, “Reactor Oversight Process Basis Document.” The technical framework for the Emergency Preparedness and Security Cornerstones does not describe design as a key attribute.

6. **Close the triennial portion of the inspection at the end of the triennial cycle. For example, if a team inspection occurs in year 1, the team portion (design/licensing) remains open until year 3. This will allow timely inspection of modifications/changes that occur in year 2 and 3. In addition, the team should be focused on performing the minimum number of samples within the given range to allow inspection throughout the triennial year. This also leads to more accurate accounting of inspection time since the regional inspectors will continue to have the ability to charge to the inspection procedure when performing inspection at the request of the resident inspector.**

   The industry disagrees with the recommendation to leave the CDBI inspection open during the three-year inspection cycle, as currently described. The industry recommends that if the CDBI is to remain open during the three-year cycle, the inspection hour allotment should be opened at the beginning of the cycle for use by the routine resident inspection program and other baseline inspections in the conduct of engineering and design inspection activity. The CDBI team inspection would then be conducted in year three of the cycle to complete the inspection using the remaining design inspection allocated hours.

7. **No reduction in level of effort is expected from the recommended revision to IP 71111.21. The Nuclear Energy Institute is currently collecting industry feedback on the NRC’s proposed changes to IP 71111.21.**

   Industry disagrees with the above statement on the level of effort. It is vital that CDBI reform consider the balance of level of effort, results and impact on licensee resources in order to restore CDBI to its original intent. Industry recommendations on team size, composition and inspection duration that would help restore that balance are included in the main body of the report.